

CLAIMS

1. A serpentine, multiple pass heat exchanger comprising:

at least one flattened multiple port tubes in a serpentine configuration with a plurality of generally parallel runs defining at least three hydraulically separate flow paths;

fins extending between and in thermal conducting relation with adjacent ones of said runs for each flow path;

an inlet manifold on one end of said tube(s) and in fluid communication with the ports therein; and

an outlet manifold on an opposite end of said tube(s) and in fluid communication with the ports therein;

the cross sectional area of one of said flow paths being greater than the cross sectional area of another of said flow paths with said one flow path being adjacent a back side of said heat exchanger through which a coolant may exit and said another flow path being adjacent a front side of said heat exchanger through which a coolant may enter;

a baffle in said outlet manifold separating said another flow path and one of the other of said flow paths from the remaining flow path(s);

said inlet manifold having inlet port through which a fluid may enter said inlet manifold and located adjacent said front side of said heat exchanger and a partition extending both longitudinally and transversely within said inlet manifold to hydraulically separate said one flow path from said inlet port while connecting said another flow path to at least one other flow path other than said one flow path.

2. The serpentine multiple pass heat exchanger of claim 1 wherein said at least one other flow path is said another flow path.

3. The serpentine multiple pass heat exchanger of claim 1 wherein said at least one
2 other flow path comprises at least two said other flow paths and one of said other flow
paths is said another flow path, and wherein said partition serves to connect said another
4 flow path to said inlet port and connect, within said inlet manifold, said one of said other
flow paths to said remaining flow path(s).

4. The serpentine multiple pass heat exchanger of claim 3 wherein said remaining
2 flow path(s) is said another flow path.

5. The serpentine multiple pass heat exchanger of claim 1 wherein said partition is
2 defined by a longitudinal partition section extending longitudinally within said inlet
manifold and terminating in a transverse partition section extending transversely to said
4 inlet manifold and said longitudinal partition at a location within said inlet manifold
between the ends thereof.

6. The serpentine multiple pass heat exchanger of claim 1 wherein said fins are
2 common to all of said flow paths.

7. The serpentine multiple pass heat exchanger of claim 1 wherein each of said flow
2 paths is defined by an individual multiple port tube, the individual tubes being in aligned,
side by side relation.

8. The serpentine multiple pass heat exchanger of claim 1 wherein each of said flow
2 paths is defined by one or more ports in a single multiple port tube.

9. A serpentine, multiple pass heat exchanger comprising:

at least one flattened multiple port tubes in a serpentine configuration with a plurality of generally parallel runs defining at least three hydraulically separate flow paths;

fins extending between and in thermal conducting relation with adjacent ones of said runs for each flow path;

an inlet manifold on one end of said tube(s) and in fluid communication with the ports therein; and

an outlet manifold on an opposite end of said tube(s) and in fluid communication with the ports therein;

one of said flow paths being adjacent a back side of said heat exchanger through which a coolant may exit and another of said flow paths being adjacent a front side of side heat exchanger through which a coolant may enter;

a baffle in said outlet manifold separating said another flow path and one of the other of said flow paths from the remaining flow path(s);

said inlet manifold having inlet port through which a fluid may enter said inlet manifold and located adjacent said front side of said heat exchanger and a partition extending both longitudinally and transversely within said inlet manifold to hydraulically separate said one flow path from said inlet port while connecting said another flow path to at least one other flow path other than said one flow path.

10. A serpentine, multiple pass heat exchanger comprising:

at least one flattened multiple port tube in a serpentine configuration with a plurality of generally parallel runs defining at least three hydraulically separate flow paths;

fins extending between and in thermal conducting relation with adjacent ones of said runs for each flow path;

a tubular inlet manifold having slit(s) receiving one end of said tube(s) to be in
8 fluid communication with the ports therein; and

a tubular outlet manifold having a slit(s) receiving an opposite end of said tube(s)
10 to be in fluid communication with the ports therein;

the cross sectional area of one of said flow paths being different from the cross
12 sectional area of another of another of said flow paths with said one flow path being
adjacent a back side of said heat exchanger through which a coolant may exit and said
14 another said flow path being adjacent a front side of said heat exchanger through which
a coolant may enter;

16 a baffle in said tubular outlet manifold separating one of the other of said flow
paths from said another flow path;

18 said tubular inlet manifold having an inlet port through which fluid may enter said
tubular inlet manifold and located adjacent said front side of said heat exchanger, a
20 longitudinal partition section extending longitudinally within said inlet manifold and
terminating within said inlet manifold, between therein the ends thereof, with a
22 transverse partition section within said inlet manifold serving to hydraulically separate
all but one said flow path from said inlet port while connecting said another flow path to
24 at least one other flow path other than said one flow path.